

## Claims

1. Macromolecular photocrosslinkers having a general formula

3-16-00

7/1

C- in P units

5 (A)<sub>n</sub>(B)<sub>m</sub>(C)<sub>p</sub>, wherein

(i) A, B and C are units of substituted ethylene or siloxane groups in the macromolecular structure;

(ii) C carries a photoactive groups;

10 (iii) n = 0-98 mole %, m = 0-98 mole %, n+m = 50-98 mole % and p = 0.5-50 mole %;

and when said photoactive groups are exposed to light of determined wavelengths above 305 nm, radicals are generated and retained on the macromolecular photocrosslinkers and reacting so as to accomplish a crosslinked network structure.

cage effect  
Angewandte  
chemie

15 2. Photocrosslinkers according to claim 1 characterized in that said photoactive group comprises a phosphine oxide.

3. Photocrosslinkers according to claim 2 characterized in that the photoactive group is an  
20 acyl- or aroyl phosphine oxide.

4. Photocrosslinkers according to claim 3 characterized in that the photoactive group is linked to the ethylene groups of units C by a linking group comprising a phenylene group, said phenylene group being optionally substituted.

5. Photocrosslinkers according to claim 1, wherein the ethylene units A, B, C of the macromolecular structure comprises substituents in accordance with:

A = -CH<sub>2</sub>-C(R<sup>1</sup>R<sup>2</sup>)-, B = -CH<sub>2</sub>-C(R<sup>1</sup>R<sup>3</sup>)-, C = -CH<sub>2</sub>-C(R<sup>1</sup>R<sup>4</sup>)-, wherein

AMENDED SHEET

17/11

WO 00/55212

PCT/EP00/02539

26

$R^1$  is hydrogen or methyl;

$R^2$  is  $-\text{CON}(\text{Me})_2$ ,  $-\text{CO}_2\text{CH}_2\text{CH}_2\text{OH}$ ,  $-\text{OCOCH}_3$ ,  $-\text{OCOCH}_2\text{CH}_2\text{Ph}$ ,  $-\text{OH}$  or a lactam group;

$R^3$  is  $-\text{CON}(\text{Me})_2$ ,  $-\text{CO}_2\text{CH}_2\text{CH}_2\text{OH}$ ,  $-\text{OCOCH}_3$ ,  $-\text{OCOCH}_2\text{CH}_2\text{Ph}$ ,  $-\text{OH}$  or a lactam group when B is  $-\text{CH}_2-\text{C}(\text{R}^1\text{R}^3)-$  with the proviso that  $R^2$  and  $R^3$  are not the same unless  $R^2$  and  $R^3$  is  $-\text{OH}$ ; and

$R^4$  is  $-\text{R}^5\text{C}(\text{O})\text{P}(\text{O})\text{R}^6\text{R}^7$  or  $-\text{R}^5\text{P}(\text{O})\text{R}^6\text{OC}(\text{O})\text{R}^7$ , wherein  $R^5$ ,  $R^6$  and  $R^7$  are selected among same or different aryl groups comprising phenyl, methylphenyl, dimethylphenyl, trimethylphenyl, methoxyphenyl, dimethoxyphenyl, trimethoxyphenyl, methylolphenyl, dimethylolphenyl, trimethylolphenyl or styryl radicals.

6. Photocrosslinkers according to claim 5, wherein  $R^2$  and  $R^3$  are selected so as to form a water-soluble molecule.

7. Photocrosslinkers according to claim 5, wherein said lactam units together with units A or B constitute N-vinylpyrrolidone units.

8. Photocrosslinkers according to claim 5, wherein at least one of  $R^2$  and  $R^3$  is hydroxyl.

9. Photocrosslinkers according to claim 5, wherein A is N-vinylpyrrolidone, B is vinyl alcohol.

10. Photocrosslinkers according to claim 1 ~~or 5~~ provided with functional groups for crosslinking.

11. Photocrosslinkers according to claim 10 provided with functional groups selected among vinylic, acrylic and methacrylic groups.

12. Photocrosslinkers according to claim 1 characterized in that units A, B and C are

Amid  
A1

WO 00/55212

PCT/EP00/02539

27

siloxane monomer units of a general formula  $-R_aR_bSiO-$ , wherein  $R_a$  and  $R_b$  in units A and B are selected among lower substituted or unsubstituted alkyl groups, aryl groups and arylalkyl groups.

13. Photocrosslinkers according to claim 12, wherein at least one of  $R_a$  and  $R_b$  is an aryl or arylalkyl group.

14. Photocrosslinkers according to claim 13, wherein at least one of  $R_a$  and  $R_b$  is substituted with one or more fluorine atoms.

15. Photocrosslinkers according to claim 1, wherein units A, B, C are siloxane units comprising substituents in accordance with:

A is  $-Si(R^1R^2)-O-$ , B is  $-Si(R^1R^3)-O-$  and C is  $-Si(R^1R^4)-O-$ , wherein

$R^1$  is C1 to C6 alkyl;  $R^2$  is C1 to C6 alkyl or phenyl;  $R^3$  is  $R^1$ ,  $R^2$  or C1 to C6 fluoroalkyl;

→  $R^4$  is  $-R^5R^6C(O)P(O)R^7R^8$  or  $-R^5R^6P(O)R^7OC(O)R^8$ , wherein  $R^5$  is a spacing group;  $R^6$ ,  $R^7$  and  $R^8$  are selected among same or different aryl groups comprising phenyl, methylphenyl, dimethylphenyl, trimethylphenyl, methoxyphenyl, dimethoxyphenyl, trimethoxyphenyl, methylolphenyl, dimethylolphenyl, trimethylolphenyl or styryl radicals.

16. Photocrosslinkers according to claim 15, wherein  $R^5$  is aliphatic spacing group comprising between one and ten atoms.

17. Photocrosslinker according to claim 16, wherein said spacing group is  $(-CH_2)_n$ , wherein n is between 1 and 10.

18. Photocrosslinkers according to claim 15, wherein  $R^1$  is methyl;  $R^2$  is methyl or phenyl;  $R^3$  is  $R^1$ ,  $R^2$  or  $-CH_2CH_2CF_3$ .

WO 00/55212

PCT/EP00/02539

28

19. Photocrosslinkers according to claim 15 having functional acrylic groups in its terminal ends.

20. A method of forming a macromolecular crosslinked network from a composition comprising a photocrosslinker according to any of claims 1 ~~to 19~~ by irradiating said composition with light exceeding a wavelength of about 305 nm for a time sufficient to form a solid article.

21. A method <sup>of</sup> forming a macromolecular crosslinked network from a composition comprising a photocrosslinker according to any of claims 1 ~~to 11~~ and at least one copolymerizable vinylic, acrylic or methacrylic monomer.

22. A method according to claim 20, wherein said composition further comprises a polymer provided with functional vinylic, acrylic or methacrylic groups.

23. A method according to claim 22, wherein said polymer has a backbone of ethylene units.

24. A method according to claim 22, wherein said polymer is a polysiloxane.

25. A method according to any of claims 20 ~~to 24~~, wherein an ophthalmic lens is produced.

26. A method according to claim 25, wherein an intraocular lens is produced in the capsular bag of the eye.

27. An ophthalmically acceptable composition comprising photocrosslinkers according to any of claims 1 ~~to 19~~ having a refractive index greater than about 1.39 and a viscosity such that said composition can be injected through standard cannula having a needle of 15 Gauge, or finer.

WO 00/55212

PCT/EP00/02539

29

28. The use of <sup>see *Ambr*</sup> photocrosslinkers according to any of claims 1 to 19 in an ophthalmologically acceptable composition for injection into the capsular bag of the eye.

09936647.022502  
205220 4993660